



Transportation Challenges

“Problems Tied to Disposition Pathways”

1999 Transportation “Barriers” Analysis

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CONTENTS

CONTENTS	i
EXECUTIVE SUMMARY	iii
PURPOSE.....	1
DOCUMENT ORGANIZATION	1
BACKGROUND.....	1
METHODOLOGY	3
EM WASTE AND MATERIALS DISPOSITION MAPS	4
NTP AND EM INTEGRATION WORKSHOPS.....	6
NATIONAL PROGRAMS, FOCUS AREAS, CENTERS OF EXCELLENCE, & OTHERS	6
SITE TECHNOLOGY COORDINATING GROUPS	6
REGIONAL GOVERNMENT GROUPS	6
NTP “BARRIERS” WORKSHOP	7
TRANSPORTATION PROBLEMS	9
ABBREVIATIONS	25
APPENDIX A BARRIERS BY WASTE STREAM	A-i
APPENDIX B DISPOSITION MAP BARRIER COLUMN HEADING DEFINITIONS	B-i
APPENDIX C SITE CODE REFERENCES	C-i

National Transportation Program 1999 “Barriers” Analysis

Transportation Challenges *“Problems Tied to Disposition Pathways”*

EXECUTIVE SUMMARY

The *National Transportation Program (NTP) 1999 "Barriers" Report - Transportation Challenges “Problems Tied to Disposition Pathways,”* summarizes the current problems affecting timely and successful transportation of waste and materials within the Department of Energy (DOE) Environmental Management Program (EM). Resolution of these problems will increase the probability of successful waste and materials disposition and decrease the likelihood of obstacles or delays due to inadequate transportation resources or lack of requisite transportation infrastructure. The problems addressed in this report generally affect more than one site and more than one waste or material stream. Many have the potential for significantly affecting scheduled site closure and/or timely waste and material disposition.

A systematic analysis of several information sources formed the basis for problem identification. Preliminary analysis yielded a set of problems or areas of improvement which were reviewed during the October 1999 Transportation “Barriers” Workshop. Workshop participants produced and qualitatively prioritized the following list of problems (in descending order):

- There are excessive delays in processing Type B and fissile packaging certifications
- Waste cannot be shipped to Waste Isolation Pilot Plant (WIPP) in time to meet legal commitments
- Inter-site Transuranic (TRU) waste cannot be shipped in time to meet legal commitments
- Packaging and transportation needs are often not included in corporate and site level planning
- There is no standardized procedure for sharing packaging among sites
- Waste and materials transportation planning and execution are not consistent across DOE EM programs
- DOE is unable to appropriately budget for the cost of packaging and transportation
- There is a lack of standardized design, procurement and Quality Assurance/Quality Control (QA/QC) of Low Level Waste (LLW) packaging
- Hydrogen gas generation impacts packaging suitability for certain materials
- Certified Nuclear Materials (NM) packagings are not available for some materials
- Some Spent Nuclear Fuel (SNF) packagings do not exist
- High Level Waste (HLW) packagings do not exist
- There are inconsistent double containment requirements for Pu
- No Remote Handled (RH) TRU packagings exist
- There is a lack of rail access to the proposed Monitored Geologic Repository (MGR) at Yucca Mountain for SNF and HLW
- Packaging for unique waste and material types does not exist.

It was confirmed that, as part of the National Transportation Program’s FY2000 work plan, resolution efforts, in coordination with affected programs, are already underway for transportation-related problems.

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PURPOSE

The *National Transportation Program (NTP) 1999 “Barriers” Report - Transportation Challenges “Problems Tied to Disposition Pathways”*, summarizes the current problems affecting timely and successful transportation of waste and materials within the Department of Energy (DOE) Environmental Management Program (EM). Resolution of these problems increases the probability of successful waste and materials disposition and decreases the likelihood of obstacles or delays due to inadequate transportation resources or requisite transportation infrastructure. This summary information is intended to facilitate understanding of the relevant problems and to initiate and coordinate any necessary resolution or mitigation actions.

DOCUMENT ORGANIZATION

The Methodology Section describes the “Systems Approach” used to analyze sources of information that identified the subject transportation problems. The Transportation Problems Section, provides a summary description of each problem including:

- Impacts
- Background
- Current Status
- Suggested solutions
- Applicable references
- List of associated waste and material streams.

Where pertinent and available, references are provided to facilitate access to additional information.

BACKGROUND

EM has pursued a number of options over the years in an effort to develop corporate solutions to DOE complex-wide waste and materials disposition problems. While the EM Program experienced some success in resolving site-specific problems, a mechanism was needed to formally exchange lessons learned and conduct complex-wide planning to ensure cost effective use of anticipated resources. In response, EM developed the *Accelerated Cleanup, Paths to Closure (AC/PC) Plan*, a supporting database, and an annual budgeting process that supports maintenance and annual update of the baseline plan.

Several integration initiatives grew out of the AC/PC effort. Most targeted identifying common problems impeding timely cleanup, remediation, and ultimately, material disposition. Historically each problem was considered an "opportunity," which once resolved, would lead to enhanced and cost-effective use of EM resources in fulfilling the cleanup and disposition mission. Transportation was and is the enabling activity to consolidate material, use corporate treatment and storage facilities, and ultimately, move materials to final disposition site(s).

Supporting transportation of EM waste and material is the responsibility of the National Transportation Program (NTP). Since decentralization and redeployment the NTP has augmented its capabilities by incorporating the ability to perform detailed options reviews for developing integrated and coordinated solution recommendations for identified transportation problems. In fact, the NTP has specifically chartered to proactively assist and affected programs in identifying cost effective options for resolving transportation related problems impacting successful program execution.

The NTP, in conjunction with the disposition programs, can use this consolidated list of transportation problems to prioritize and coordinate the development and maintenance of necessary resources and infrastructure. The resources and infrastructure will support and ensure timely, cost effective transportation of all materials to be moved for treatment and disposition. The Transportation Problems Section describes transportation-related problems facing DOE that are complex, varied, interdependent, and potentially "show-stopping." Program and project managers can use this data to better understand transportation problems, and to recognize other programs and projects potentially affected by program-specific transportation decisions. Having the data and understanding the problems should facilitate effective coordination of necessary transportation planning and execution Complex-wide.

METHODOLOGY

The problems addressed in this report generally affect more than one site and all have the potential for significantly affecting scheduled site closure and/or timely waste and material disposition. Problems were identified using a systematic approach to analyze several sources of information. (See Figure 1).

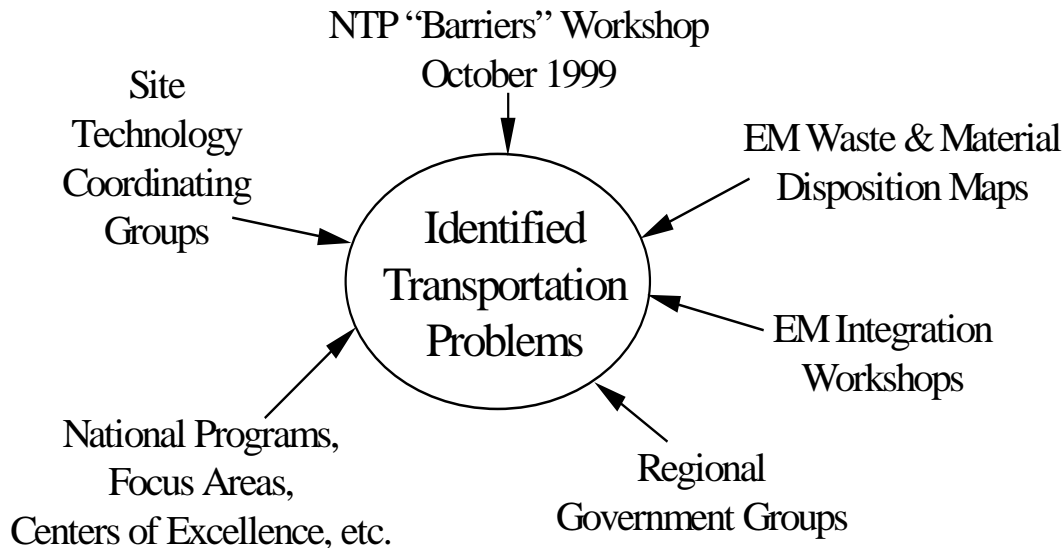


Figure 1. Sources of National Transportation Program problems.

The initial source for identification of transportation problems was the "Paths to Closure" database and supporting documents including waste stream disposition maps. The AC/PC database yielded a comprehensive list of issues that have been generated and entered into the database by waste and materials stream experts. Additional issues were gathered from several joint NTP and Environmental Management Integration (EMI) workshops, Site Technology Coordinating Groups (STCG), National Programs, Focus Areas, Centers of Excellence, and Regional Government Groups. Not depicted in Figure 1 are a number of potential problem sources, the review of which did not identify issues relating to transportation, (e.g., Environmental Impact Statements, Nuclear Material Management Plans, and various National Program Plans).

At the October 19-21, 1999 NTP "Barriers" Workshop, attendees reviewed an initial list of problems generated from the issues analysis. The workshop included representatives from major programs and sites, Traffic Managers, and NTP representatives from Albuquerque Operations Office (AL), Idaho Operations Office (ID), and DOE Head Quarters (HQ). In addition to reviewing the preliminary list, workshop participants also identified a primary NTP lead for each problem and the external interface or customer that would benefit most by having the problem resolved.

The outcome of the systematic process yielded 16 transportation related problems. Analysis of the waste stream disposition maps, in which 29 waste streams held 35 transportation-related issues, yielded six identified transportation problems. Analysis of additional resources (e.g.,

technical reports, meetings, etc.) yielded the balance of the 16 transportation-related problems. The problems identified suggest that there are areas where potentially serious impacts to programs exist while others have significant opportunities for efficiency improvements. A “qualitative” analysis has been conducted on each problem to determine a severity index or risk category. Each of the problem sources is described in detail in the following sections.

EM Waste and Materials Disposition Maps

EM faces technical and financial challenges in cleaning up the environmental legacy of nuclear weapons production. EM has developed a comprehensive system that integrates the waste stream disposition plans for legacy materials and wastes for over 50 DOE EM sites. The EM annual Integrated Planning, Accountability, and Budgeting System (IPABS) data call allows programs and sites to collect essential planning data. The data provide detailed waste stream information facilitating generation of material disposition maps that graphically display waste and material amounts at each site, as well as the associated planned disposition paths. This system provides graphical interactive disposition maps indicating problems that may be associated with a particular waste stream or activity. Disposition maps for all sites can be found on the DOE-EM web site at <http://www.em.doe.gov/closure/>.

The IPABS database requires and depends on voluntary site input. Many sites do not have a common understanding of the need for this input, who is responsible for it, and how it should be provided. Therefore, the disposition maps do not currently depict all of the known transportation-related issues and some maps relate issues to transportation incorrectly. Figure 2 illustrates the process used to correctly identify waste and material stream transportation issues, as well as appropriate steps to implement the disposition pathway.

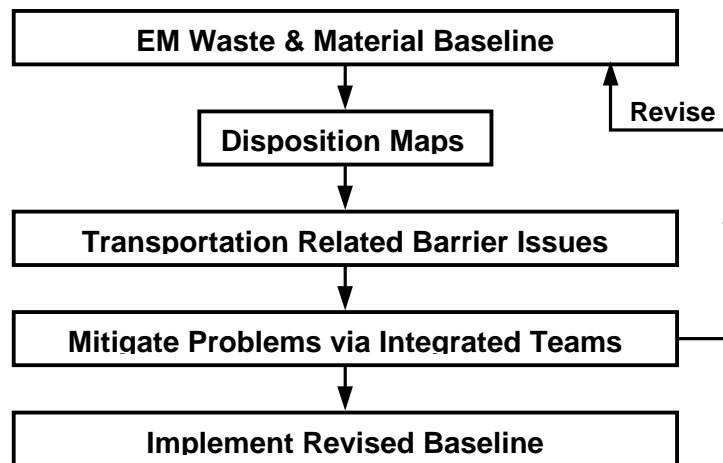
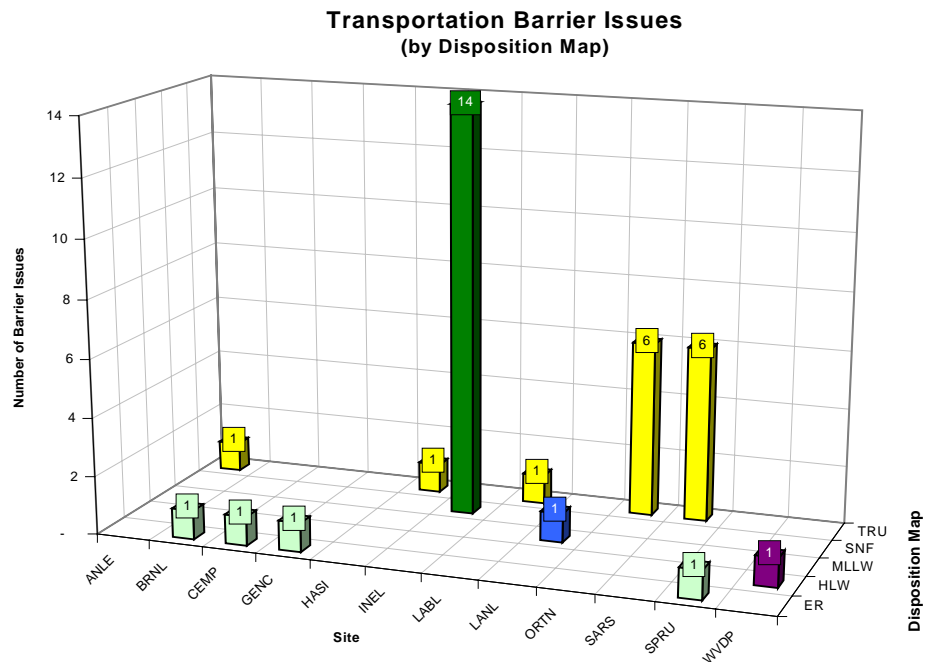
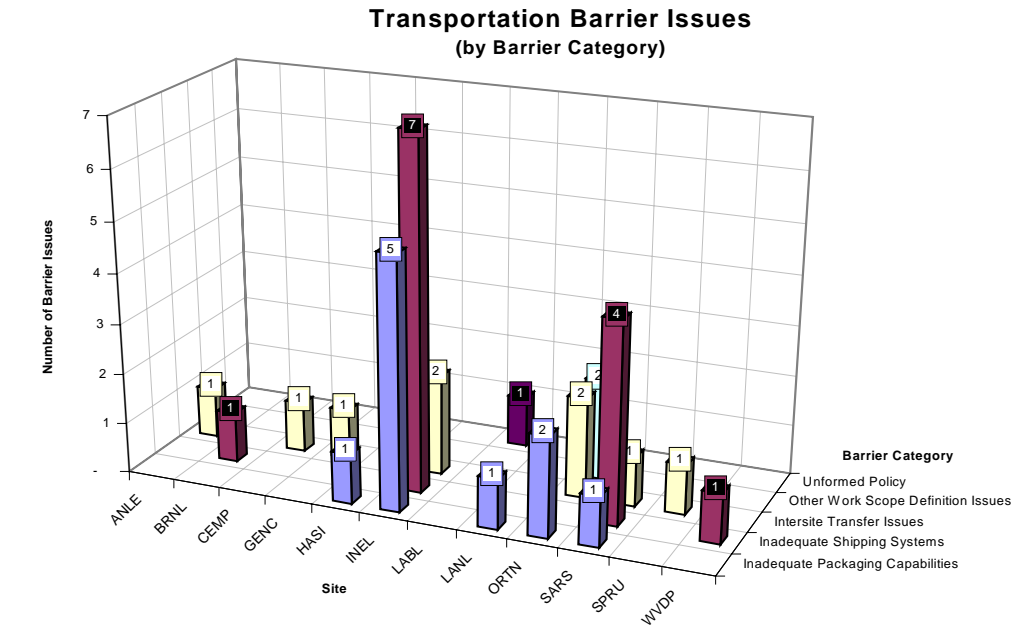


Figure 2. Issue Identification/Resolution Process.

The waste and material stream data are entered by the sites into the IPABS database via the Analysis and Visualization System (AVS) that generates the disposition maps. This information provides a wealth of useful planning data including, waste and material types, quantities, location, destination, barrier issues, packaging, transportation mode, and schedule. The data, and its graphical representation (disposition maps), identify problems by site and program. As

indicated above, six transportation-related problems were identified via 35 issues on the disposition maps.

The following two charts summarize the 35 transportation-related barrier issues by barrier category and disposition map. Appendix A provides a table listing the 35 transportation-related barrier issues with cross-references to the problems in the Transportation Problems Section and the current Opportunities. Appendix B defines the column headings for Appendix A, and Appendix C provides a list of acronyms for the sites referenced in Appendix A.



NTP and EM Integration Workshops

The NTP and EMI have sponsored a number of workshops over the past three years where subject matter experts from various sites and programs meet for several days to identify joint issues and propose potentially feasible integrated solutions. The first transportation workshop held in March 1997 identified more than 20 transportation problems for which participants developed proposed solutions. In most cases, subsequent workshops have addressed proposed solutions or “Opportunities” and have been held to gather detailed additional information for analysis prior to approval and programmatic implementation.

Opportunities are being tracked by the EMI via specific alpha-numeric designations such as: “A-13 *Disposition of Material and Waste with no Path to Disposal*,” or “B-10 *Standardize Containers*.” Most of the transportation-related opportunities have “B” designations. Transportation Opportunities previously identified are cross-referenced to the appropriate problems in the Transportation Problems Section.

National Programs, Focus Areas, Centers of Excellence, & Others

Documentation was reviewed as available from national programs, focus areas, centers of excellence and other DOE entities to identify their lists of transportation-related problems. Documents from the following organizations were reviewed:

- Mixed and Low-Level Waste Center
- National Transportation Program
- National Materials Stabilization/Plutonium Stewardship Program
- National Spent Nuclear Fuel Program
- Tanks Focus Area
- Subsurface Contaminants Focus Area
- Decontamination and Decommissioning Focus Area
- Office of Civilian Radioactive Waste Management
- DOE-AL sponsored Nuclear Materials Packaging and Shipping Committee
- National Transportation Program Packaging Management Council
- National Transuranic (TRU) Waste Program.

Site Technology Coordinating Groups

Within the DOE Science and Technology (S&T) program, Site Technology Coordinating Groups identify problems that require the application of new science and technology. These problems and their associated technology needs were reviewed for transportation impacts and included, as appropriate, in the Transportation Problems Section.

Regional Government Groups

Several stakeholder groups have been organized to address DOE Transportation of Waste and Materials. These groups have made recommendations for improving the safety and efficiency of DOE Waste and Materials Transportation. The issues tied to these

recommendations were analyzed as part of this activity and provided as references in the Transportation Problems Section where appropriate. Among the stakeholder groups are:

- Environmental Management Advisory Board
- Transportation External Coordination Working Group (TEC/WG)
- State and Tribal Governments Working Group (STG/WG)
- Site-Specific Advisory Boards
- Western Governors Association
- Southern States Energy Board
- Midwest Council of Governments
- Northeast Council of Governments
- National Governors Association.

NTP “Barriers” Workshop

The October 19-21, 1999 Transportation Barriers Workshop held in Albuquerque, NM, identified the transportation challenges associated with planned waste and materials disposition. Workshop attendees included EM program representatives and several site Transportation Managers. The attendees analyzed DOE’s EM waste and material disposition pathways to identify transportation issues or problems to be addressed by the National Transportation Program to promote successful program execution. After detailed review of the waste stream disposition maps, the workshop participants developed a list of 16 transportation-specific problems and/or areas requiring improvement.

The workshop participants analyzed each problem to determine the programmatic disposition risk category. Each problem was “*qualitatively*” categorized based on the definitions from the 1999 IPABS data call guidance. The risk category definitions are detailed below. Note that the risk categories are tied to a “stop light” color: RED, YELLOW, or GREEN. Stop Light icons are interactively depicted on each disposition map pathway as the pathway is analyzed by the responsible waste or material stream expert.

Disposition Path Transportation Problem Risk Categories

The disposition path transportation problem risk categories are defined:

- **RED** – Path is inoperable. Significant barriers must be overcome before implementation can be accomplished. *High Risk* - Red stoplight on Disposition Map Path
- **YELLOW** - Path forward is identified but not assured. Some uncertainty or minor problems exist that could impede implementation. *Medium Risk* - Yellow stoplight on Disposition Map Path
- **GREEN** - Path is operable. No significant issues or schedule delays are anticipated. Improvements will increase efficiency. *Low Risk* - Green stoplight on Disposition Map Path.

Once the risk categorization process was complete workshop participants then completed a high level “*qualitative*” prioritization of the 16 problems statements. Four criteria were evaluated to develop a prioritized list of the problems. The criteria for the “*qualitative*” scoring are defined below:

- IMPORTANCE:** A high score for "importance" indicates that overcoming this problem is critical to the overall Environmental Management mission.
- URGENCY:** A high score for "urgency" indicates that it is critical to overcome this problem within the next eighteen months.
- DIFFICULTY:** A low score for "difficulty" indicates that this problem will be very difficult to overcome.
- INTEGRATION:** A high score for "integration" indicates that overcoming this problem will have a strong positive effect on other issues, problems, programs, etc.

The scoring was accomplished by considering each criterion separately for each problem. The criteria were not "weighted," but analysis of the results indicated that weighting would have had no impact on the outcome. The results of this scoring were intended to provide guidance to help assure that important problems receive the attention they merit. The problems agreed to as having the highest priority for near term resolution are listed, in descending order:

- There are excessive delays in processing Type B and fissile packaging certifications
- Waste cannot be shipped to WIPP in time to meet legal commitments
- Inter-site TRU waste cannot be shipped in time to meet legal commitments
- Packaging and transportation needs are often not included in corporate and site level planning
- There is no standardized procedure for sharing packaging among sites
- Waste and materials transportation planning and execution are not consistent across DOE EM programs
- DOE is unable to appropriately budget for the cost of packaging and transportation
- There is a lack of standardized design, procurement and QA/AC of LLW packaging
- Hydrogen gas generation impacts packaging suitability for certain materials
- Certified NM packagings are not available for some materials
- Some SNF packagings do not exist
- HLW packagings do not exist
- There are inconsistent double containment requirements for Pu
- No RH TRU packagings exist
- There is a lack of rail access to the proposed Monitored Geologic Repository (MGR) at Yucca Mountain for SNF and HLW
- Packaging for unique waste and material types does not exist.

Based on NTP FY-00 work priorities agreed to during the annual NTP budget allocation process and the related development of NTP Annual Operations Plans, NTP, in concert with the affected programs, already has work underway towards resolution of the first eight problems listed above. As resolution recommendations are finalized regarding these issues, the NTP will initiate new work to address the remaining issues as well as others as they may surface during the waste and materials disposition planning.

TRANSPORTATION PROBLEMS

This section presents a summary of the seventeen significant DOE transportation problems from all sources. Each problem is briefly described along with the expected effect if the problem is not resolved. Where possible, background is provided, along with a summary of current efforts to resolve the problem. The references provided offer additional information.

1. There are excessive delays in processing Type B and fissile packaging certifications.	
Problem YELLOW	The timeliness of Type B and Fissile container certification, re-certification or modification by DOE EM-5 Packaging Certification Program does not meet some near-term programmatic needs.
Impacts	<ul style="list-style-type: none"> Increased near-term costs, possible penalties, greater mortgage costs Missed milestones, closure and project completion delays <p>Examples:</p> <ul style="list-style-type: none"> Delayed re-certification of the 9975 and SAFKEG containers may impact some site closure schedules.
Background	<p>A Reengineering Evaluation performed by EM in July 1998 recommended several improvements to the certification process.</p> <p>N Basin fuel at Hanford requires a packaging modification to the Certificate of Compliance.</p>
Status	EM is evaluating the Reengineering recommendations. NTP-AL has actively supported a creation of a Packaging Certification Advisory Group to provide advice to aid in the improvement of the current process for preparing, reviewing, and certifying applications for offsite transportation of fissile and Type B packages. The Packaging Certification Program has developed a certification schedule based on needs identified by program offices.
Suggested Solutions	<ul style="list-style-type: none"> Implement Reengineering recommendations Contract out certification reviews Encourage the private sector to build and certify packagings meeting DOE needs Re-align assignments to give EM responsibility for "in commerce" and DP responsibility for "out of commerce" certifications (NMPSO) Create a Center of Excellence for SARP Writing (NTP and NMPSO) Obtain packaging exemptions rather than developing SARP (NMPSO)
References	<ul style="list-style-type: none"> <i>Reengineering EM's Packaging Certification Program, Outcomes Resulting from a Process Improvement Workshop to Reengineer the EM-70 Package Certification process</i>, DOE/EM-0383, November 1998. Nuclear Materials Stewardship – Packaging and Shipping Committee Meeting Minutes, DOE-AL dated July 30, 1999 EMI Opportunity B-5 - <i>DOE Self-Certification</i>.
Waste/Material Type	HLW, LLW, MLLW, NM, SNF

2a. Waste cannot be shipped to WIPP in time to meet legal commitments.	
Problem YELLOW	Waste cannot be shipped to WIPP to meet legal commitments based on the current TRUPACT II Certificate of Compliance and mode of transport.
Impacts	<ul style="list-style-type: none"> • Will not meet ID agreements • Will not meet (major sites) FCO agreements. • The cost for shipping TRU waste to WIPP may be much higher than if other proven, safe shipping containers and modes were used.
Background	<p>Securing the approval of a single type of NRC certified packaging expedited the opening of WIPP.</p> <p>The currently certified casks have limits on the payload size, weight, quantity of fissile material, and watts. Expanding the payload authorization is necessary to allow some materials to be shipped and others to be shipped more efficiently.</p>
Status	This problem is being addressed as part of the Carlsbad Area Office (CAO) Reengineering the Waste Pipeline Workgroup. Three technical teams have been established - Characterization, Transportation, and Disposal - to look at streamlining procedures and ways to optimize shipments to WIPP. A Request for Proposal (RFP) has been issued to procure additional TRUPACT II containers. The National TRU Program is working to expand the payload of the TRUPACT II.
Suggested Solutions	<ul style="list-style-type: none"> • Submit a letter requesting NRC approval to use IP Packages to Ship CH-TRU to WIPP. • Change the WIPP Protocol to allow IP Packaging • Change the definition of TRU waste • Examine rail transport to WIPP
References	<ul style="list-style-type: none"> • STCG Needs: SR99-1001 • Disposition Map Waste Stream: TRU 00294, 00425, 00430, 00431, 00432, 00566, 00567, 00571, 01769, 03039, 03043, 003223 • EM Needs Management System (IPABS Data Requirement #1088): MW-05 <i>Payload Enhancement for Transporting TRU Waste</i>, MWFA • Land Withdrawal Act – PUBLIC LAW 102-579 • EMI Opportunity A-2 <i>Improve Transportation Systems for TRU Waste</i> • EMI Opportunity B-12 <i>Enhance Type B Packaging</i> • EMI Opportunity B-14 <i>WIPP Land Withdrawal Act Packaging Restrictions WIPP</i>
Waste/Material Type	TRU

2b. Inter-site TRU waste cannot be shipped in time to meet legal commitments.	
Problem YELLOW	Inter-site TRU waste cannot be shipped in time to meet legal commitments based on the current TRUPACT II Certificate of Compliance and mode of transport.
Impacts	<ul style="list-style-type: none"> • May preclude intersite transfers affecting site closures at Mound, BCL, ETEC, WVDP and MURR • Increased costs and delayed schedules to construct and permit treatment facilities
Background	There are small quantities of TRU waste at sites scheduled for early closure that do not meet the TRUPACT II Certificate of Compliance or the WIPP WAP. Failure to successfully address this problem will prevent or delay closure.
Status	<p>The atomic monitors explosives transport (ATMX) railcars are being evaluated for use to ship Mound waste off-site for interim storage and certification prior to shipment to WIPP. The ATMX exemption renewal has been submitted to DOT. Mound has issued a contract to upgrade 2 to 5 ATMX cars that have been stored at Rocky Flats. Inter-site workgroup has put together an implementation team led by the Idaho TRU Program.</p> <p>The Small Quantity Sites (SQS) issue is also being explored as part of the re-engineering WIPP effort.</p>
Suggested Solutions	<ul style="list-style-type: none"> • Ship waste as categorized by DOT to consolidation site • Inter-site TRU shipments should be made under the LLW Transportation Protocols • Engage Stakeholders on inter-site transfer issues
References	<ul style="list-style-type: none"> • Disposition Map Waste Stream: TRU 00015, 01726, 01866 • EMI Opportunity A-1 Consolidate TRU Waste Storage • EMI Opportunity B-16 Employ ATMX Railcars for TRU Transportation
Waste/Material Type	TRU

3. Packaging and transportation needs are often not included in corporate and site level planning.	
Problem GREEN	Packaging and transportation needs are often not included in corporate and site level planning early enough to enable programs to meet their schedules. Uncertainty in the waste and nuclear material stream data contributes to the inability to perform timely corporate planning for packaging and transport needs. Yearly actual transportation activity is not being compared with planned activity.
Impacts	<ul style="list-style-type: none"> Increased costs and delay of schedules due to the need to expedite packaging design and certification and lack of resource planning and utilization Resource utilization can not be optimized. Delayed schedule due to delayed stakeholder interface Transportation may become an impediment to site closure and result in compliance milestone slippage Uncoordinated shipment of DOE waste and materials increases cost and threatens delays in meeting compliance milestones. Sites and Programs often compete for funding, resources, and packaging which makes integrating future transportation efforts essential, but difficult. Strategic transportation-related decisions are difficult to defend without an integrated schedule.
Background	<p>The Paths to Closure database (IPABS) requires that sites identify the types of packagings needed to support future shipments. To date, the sites have not provided complete and accurate data. Specific data are required for Type B packaging and large items needing transport.</p> <p>Although the Packaging Management Tracking System (PMTS) has been recently enhanced to provide web capability, the necessary data have not been provided by packaging owners to fully utilize this important tool.</p>
Status	<p>Packaging information was input by the sites into the EMI AVS as a part of the 1999 data call. The current data are based on the July 30, 1999 input.</p> <p>The NM Program has an integrated schedule for all nuclear materials movements that will use the Transportation Safeguards Division Systems.</p> <p>The National SNF Program has an integrated schedule for international and domestic shipments.</p> <p>Transportation has been raised to a higher level of visibility at the HQ level.</p> <p>NTP is developing an integrated schedule for all sites and Programs, to be issued in FY2000.</p> <p>The Prospective Shipment Module is being enhanced to show a twelve-month projection of shipments.</p>
Suggested Solutions	<ul style="list-style-type: none"> Compare actual shipments to planned shipments. Integrate Transportation programs with waste and materials programs and establish programmatic performance metrics. Tie the Program Managers' Guide implementation to DOE Order 460.2.
References	<ul style="list-style-type: none"> EM Home Page – Paths to Closure web site EMI Opportunity B-13 <i>Optimize Shipping Schedule</i>.
Waste/Material Type	HLW, M/LLW, NM, SNF, TRU

4. There is no standardized procedure for sharing packagings among sites.	
Problem GREEN	When a packaging is shared from site to site, it may not be accompanied by operating instructions, SAR, maintenance records, and/or periodic PM records. Liability issues are not covered. No scheduling guidance. No guidance to identify opportunities to share packagings. No mechanism for disposition of excess packagings.
Impacts	<ul style="list-style-type: none"> Increased cost due to duplication of packaging procurements.
Background	Currently, there is no uniform formal system of container exchange among DOE sites to optimize the container utilization. Each site is responsible for designing, procuring, and maintaining containers based on their needs. If needed site is also responsible for seeking container approval from NRC or EM-1 based on contents to be shipped. There is a need for uniform procedures defining the responsibilities of container owner sites and container user sites and their respective program offices. One example of such an agreement is recently signed Memorandum of Understanding (MOU) between EM and DP with regard to the use of certain DP-owned containers.
Status	MOU between DP and EM on certain packages could be used as a model. Population of PMTS is underway. Security review of system is underway. NMPSO has a list of NM Packaging in the system.
Suggested Solutions	<ul style="list-style-type: none"> NTP AL/ID should be assigned to populate PMTS and tie the inventory to the information in RAMPAC Design a protocol to share packagings Establish a clearing house for packagings Appoint a packaging czar Develop funding for maintenance and deployment of packagings Develop leasing arrangements
References	<ul style="list-style-type: none"> EMI Opportunity B-11 <i>Inadequate Supply of Type B Packaging</i> EMI Opportunity B-12 <i>Enhance Type B Packaging</i>
Waste/Material Type	HLW, LLW, SNF, TRU, NM

5. Waste and materials transportation planning and execution are not consistent across DOE EM programs.	
Problem YELLOW	Waste and materials transportation plans, procedures, precedents and execution are not consistent as DOE interfaces with stakeholders and state/local/tribal governments.
Impacts	<ul style="list-style-type: none"> • The cost of resulting transportation is much higher than that required by regulatory and DOE requirements • Stakeholders perceive that they are treated unfairly because of non-uniform interface and support • Critics use inconsistency to infer lack of appropriate management control.
Background	<p>At the request of stakeholders and DOE Program Managers, a Protocols Task Team has prepared a set of standard protocols for DOE use. Under the direction of the SETF, this team is working with the TEC/WG to develop standard transportation protocols.</p> <p>Protocols are to be developed individually by waste and material types. The NTP-ID has developed a comprehensive list of referenced requirements that govern transport within DOE.</p>
Status	The Protocols Steering Committee, chaired by EM, has chartered a writing group of transportation experts to develop standardized transportation protocols for all waste and materials types. Issuance of a uniform set of compliant protocols is expected in FY2000.
Suggested Solutions	N/A
References	<ul style="list-style-type: none"> • State and Tribal Governments Working Group recommendation 1997 • Western Governors Association, Resolution 98 – 006, June 30, 1998 • Foreign Research Reactor West Coast Shipment SNF Transportation, External Lessons Learned, October 5, 1998 • EMI Opportunity B-7 <i>Excessive Requirements</i> • EMI Opportunity B-8 <i>Single DOE Policy</i>
Waste/Material Type	HLW, M/LLW, NM, SNF, TRU

5. DOE is unable to appropriately budget for the cost of packaging and transportation.	
Problem GREEN	Project planning and budget requests do not explicitly identify and monitor transportation and packaging costs associated with program execution. DOE has no defined mechanism to account for transportation costs, nor a "champion." The boundaries of "transportation" have not been defined. Because programs do not identify transportation costs, they may consider the costs to be insignificant.
Impacts	<ul style="list-style-type: none"> • Dollars allocated to the transportation infrastructure do not align with the project shipping schedules • Inability to optimize transportation functions for cost and schedule efficiency • Inability to assess transportation needs required for closure of sites • Lack of adequate funding for transportation activities
Background	During DOE Industrial Packaging Task Subgroup investigations, it was necessary to independently develop models and assumptions in order to estimate the cost of LLW packaging and transportation.
Status	NM is quantifying the cost of TSD transportation for cross program cost sharing discussions. NTPA is working with OR on a transportation cost-estimating model. ATMS has a corporate reporting module to track contracted/hired carrier costs.
Suggested Solutions	<ul style="list-style-type: none"> • Include transportation costs in the IPABS data call. • Define what "transportation" includes (parameters). • Develop a transportation cost reporting and tracking capability. • Establish communications between programs and Transportation to capture transportation costs.
References	<ul style="list-style-type: none"> • NTP-sponsored, October 19-21, 1999 Transportation Barriers Workshop • <i>Evaluation of the Container Working Group Long-Term Recommendation Related to standardization of Waste Containers and Adoption of Transport Packaging Policy</i>, dated June 1999, approved by Ashok Kapoor
Waste/Material Type	HLW, M/LLW, NM, SNF, TRU

7. There is a lack of standardized design, procurement and QA/QC of LLW packaging.	
Problem GREEN	The lack of a standardized design, procurement, and QA/QC of certain LLW (and MLLW) packagings results in some packaging that does not meet normal conditions for life-cycle operations and transport.
Impacts	<ul style="list-style-type: none"> Preventable container failures result in increased costs and delayed schedules. For example, LLW shipment from the Fernald, OH site was suspended for over a year because of a leaking container.
Background	Leakage from an LLW container was discovered in 1997 (Kingman, AZ) while in transit from Fernald, OH to the Nevada Test Site. The incident received significant press coverage and was found to be typical of several packaging failures noted at the receiving site. DOE's Container Working Group researched the issue and proposed several recommendations. DOE-AL organized a team of experts to evaluate the recommendations for implementation. This team developed an implementation plan to improve the design, testing, procurement and QA of LLW packaging. Also in 1997, the EMI team identified the need for standardized packing and developed opportunities B-10 "Standardized Containers" and B-3 "Shipping LSA-II Waste in Strong, Tight Containers." The IEC approved B-10 for implementation (which closes the opportunity) and approved B-3 for detailed evaluation and implementation plan development.
Status	NTP-AL is requesting support from the SETF to establish a policy on LLW container performance testing and is evaluating implementing efficiencies for LLW container standardization. Two teams will be formed to implement the improvements (one for design and testing requirements and one for procurement and QA).
Suggested Solutions	N/A.
References	<ul style="list-style-type: none"> Disposition Map Waste Stream: TRU 03039, 03043 <i>Type B Accident Investigation Board Report of the 12/15/97 Leakage of Waste Containers Near Kingman, AZ</i>, dated February 1998, approved by G. Leah Dever <i>Recommendations for Meeting DOT Requirements for Strong and Tight Containers and Industrial Packaging</i>, dated April 1998, approved by James M. Owendoff <i>Evaluation of the Container Working Group Long-Term Recommendation Related to standardization of Waste Containers and Adoption of Transport Packaging Policy</i>, dated June 1999, approved by Ashok Kapoor EMI Opportunity B-3 LSA-II in Strong Tight Containers EMI Opportunity B-10 Standardized Containers
Waste/Material Type	M/LLW

8. Hydrogen gas generation impacts packaging suitability for certain materials.	
Problem RED	There is an inability to meet regulatory concerns (IN-84-72) with regard to gas generation in some transport containers without costly processing or repackaging.
Impacts	<ul style="list-style-type: none"> Significantly increased operational costs and delayed milestone completion. Some materials may not be shipped in existing containers Some materials may require reprocessing and/or repackaging prior to shipment
Background	DNSFB Recommendation 94-1 noted that some TRU materials have the potential for hydrogen gas generation (e.g., plutonium isotopes mixed with hydrogenous materials). Although this recommendation focused primarily on plutonium storage, implications for shipment must also be considered. The technical concern is that the hydrogen gas generated may accumulate in a container in sufficient concentration to allow deflagration, possibly resulting in contamination and exposure. The currently approved WIPP shipping casks are not vented and have very conservative NRC regulatory limits for hydrogen gas concentration. Current models for estimating projected hydrogen gas generation in waste packages are also very conservative and severely limit the amount of such materials that can be shipped.
Status	<p>The TRU Waste Program has a working group addressing this problem and considering several alternatives for its solution.</p> <p>MWFA is working the problem.</p> <p>The NTP-AL is leading an effort to coordinate gas generation resolution efforts and will hold a technical conference January 26-27, 2000.</p> <p>NMPSO is funding gas generation R&D for the 3013 Standard. NMPSO is funding developing of a pre-shipment gas test apparatus.</p>
Suggested Solutions	<ul style="list-style-type: none"> Complete development of the ANSI standard. This standard will provide a consistent approach to testing, analysis, and mitigation of gases that could cause a pressure building up or a potentially flammable mixture in a package containing radioactive materials. Propose a rulemaking change to Part 71 for vented casks.
References	<ul style="list-style-type: none"> Disposition Map Waste Stream: TRU 03223 DNSFB Recommendation 94-1 STCG Needs: SR99-1001, SR99-5018, SR-5017, RF-SNM01, RF-WM03, AL-09-01-15, AL-09-01-17, ID-S.1.03, ID-3.1.38, ID-3.1.33, ID-3.1.34 MWFA TTP AL16MW43 (99), Hydrogen Gas Getters for TRU Waste, and TTP ID09MW41 (99) Deployment of TRU Solutions <i>Hydrogen Gas Generation Research and the Resolution of Programmatic Issues in the DOE Complex</i>, J. G. McFadden DOE-RL, April 29, 1999. NRC Information Notice 84-7 EMI Opportunity A-2 <i>Improve Transportation Systems for TRU Waste</i>. EMI Opportunity B-17 <i>Develop Method for Transporting High Hydrogen Generation TRU Waste</i>
Waste/Material Type	NM, TRU

9. Certified NM packagings are not available for some materials.	
Problem RED	There are no properly designed Type B packagings for some NM.
Impacts	<ul style="list-style-type: none"> RF is unable to ship plutonium oxides, plutonium fluorides, bi-metal and contaminated parts Including low quality oxides (10-30% plutonium oxides) in the 3013 Standard will drive certification efforts and site closure dates.
Background	Some suitable NM packagings have not yet received certification. There are some forms of NM for which no suitable packaging has been designed.
Status	NMPSO, NM Packaging Committee, is coordinating needs with sites and NTP. LANL is working on a SAFKEG container and a leak testable 6M. SRS is working on 9975. DT22 is being worked by RF and WPD. ES2 is being worked by OR. SAFKEG is being reviewed by EM-5 Packaging Certification; 9975 is in for Rev. 7. SNL is working on a pilot Type B packaging needs determination project based on current material characteristics.
Suggested Solutions	<ul style="list-style-type: none"> Carry out a long term analysis of existing and potential NM Packaging needs to determine whether current designs can be matched up to materials. The long-term analysis should also look at needs for new designs. Efficiencies could be gained by making the Type A Fissile and Type B containers an integral part of the transport vehicle. Share packagings among sites and Programs. This can significantly reduce the cost of new packaging, but will require unprecedented cooperation.
References	<ul style="list-style-type: none"> EMI Opportunity B-12 <i>Enhance Type B Packaging</i>
Waste/Material Type	NM

10. Some SNF packagings do not exist.	
Problem RED	No certified Type B packagings exist for some types of SNF.
Impacts	<ul style="list-style-type: none"> • Inability to ship SNF to the repository beginning in 2010. • Generators will require additional storage capacity. • Multiple Canister Overpacks (MCOs) will have to be stored on-site at RL • SNF will have to be stored indefinitely at sites. • The MCOs at RL will be oversized and over-weight for truck transportation. • No cask designed to ship MCOs from RL to repository. • (Insufficient numbers of packagings is addressed in Problem 13.)
Background	Many forms of SNF have never been shipped off-site.
Status	National SNF is working on a new transportation concept for a rail cask. EM is lead to develop, license and construct cask for transport to potential repository. Commercial vendors are looking at new dual-purpose SNF cask designs.
Suggested Solutions	<ul style="list-style-type: none"> • Coordinate with commercial vendors to see what they are working on and tie to DOE needs. • Look at privatization
References	<ul style="list-style-type: none"> • Disposition Map Waste Stream: TRU 01568; SNF 00728, 00730, 00732, 00738, 00740, 00742, 00744, 02688 • STCG Needs: ID-1.1.14 • EMI Opportunity B-12 <i>Enhance Type B Packaging</i>
Waste/Material Type	SNF

11. HLW packagings do not exist.	
Problem RED	There are no certified Type B packagings for HLW.
Impacts	<ul style="list-style-type: none"> • Inability to close West Valley Demonstration Project (WVDP), New York • Additional storage capacity at WVDP will be required. • Inability to ship HLW to the repository beginning in 2010. • Generators will require additional storage capability.
Background	<p>There are no casks designed for shipment of vitrified HLW at RL, INEEL, SRS, WVDP</p> <p>Non-vitrified HLW such as the INEEL calcine is being evaluated for shipment to RL for vitrification.</p> <p>An STCG need identifies the benefits of developing a computer code to help optimize packaging combinations.</p>
Status	National SNF Program is working on a rail cask that would be a viable option to transport HLW. RW has the charter to do the transportation cask design for EM HLW to be sent to the potential repository.
Suggested Solutions	<ul style="list-style-type: none"> • Use National SNF transportation concept for HLW (Gladson) • Standardized log sizes • Mix the high activity waste with low activity waste. • Maximize to the allowable weight
References	<ul style="list-style-type: none"> • Disposition Map Waste Stream: HLW 00634 • STCG Needs: ID-1.1.14 • EMI Opportunity B-12 <i>Enhance Type B Packaging</i>
Waste/Material Type	HLW

12. There are inconsistent double containment requirements for Pu.	
Problem GREEN	Some solid plutonium forms over 20 Ci/pkg. require double containment packaging because of NRC regulations.
Impacts	<ul style="list-style-type: none"> Increased cost and increased radiation exposure. Increased package weight may result in requirement for overweight/oversize permits to ship. May require specialized handling equipment.
Background	Under current NRC requirements, double containment is required for all forms of plutonium except for specified solids in the form of reactor fuel elements, metal or metal alloys, or vitrified HLW. NRC allows “other plutonium bearing solids” to be exempted on a case-by-case basis, but the exemption process is time consuming and costly to pursue for each specific waste form. DOT regulations in determining limits for non-dispersible materials known as the A-1 and A-2 values respectively, take radiological risks into account for each individual radionuclides, including those of plutonium, when setting packaging limitations. While recognizing the need to prevent atmospheric dispersion of respirable plutonium as a result of a shipping accident, DOE believes the DOT regulations are adequate and that the NRC requirement for double containment is inconsistent and unnecessary.
Status	The NTP is organizing a team of experts to evaluate the path-forward resolution. Actions under consideration include: (1) change the NRC requirement to match IAEA regulations, (2) determine whether this requirement was intended to plutonium liquids only, (3) determine how many materials in the baseline disposition maps will require double containment, (4) Trace NRC rulemaking history and basis for existing decision.
Suggested Solutions	<ul style="list-style-type: none"> Establish a cross-cutting team to look at technical, safety and economic issues. Delete the DOE Order 460.1a requirement for HQ approval to ship plutonium over/equal to 20 Ci
References	<ul style="list-style-type: none"> 10 CFR Part 71.63 <i>Special Requirements for Pu Shipments.</i> EM Needs Management System (IPABS Data Requirement #1088): <i>Pu-03 Pu Packaging and Storage.</i> EMI Opportunity B-18, <i>Revision of NRC Double Containment Requirements for Pu Transportation.</i>
Waste/Material Type	NM, SNF, TRU

13. No RH TRU packagings exist.	
Problem RED	No certified Type B packagings exist for RH TRU.
Impacts	<ul style="list-style-type: none"> • Inability to close BCL, WVDP, and ETEC. • Inability to ship any RH TRU to WIPP. • The projected 72B will not be able to meet the needs of all RH TRU.
Background	RH TRU has never before been shipped for offsite disposal.
Status	<p>The National TRU Waste Program is reviewing a recommendation to prepare shielded pipe component designs for inclusion in the TRUPACT-II SAR Amendment 19 (Feb 2000). This would allow some shipments for small quantities of RH.</p> <p>NRC has certification application for the 72B submitted by CAO.</p> <p>BCL is working with ChemNuclear to license a cask for RH TRU.</p> <p>Battelle Columbus Laboratory (BCL) is trying to certify a cask for 8 drums.</p>
Suggested Solutions	<ul style="list-style-type: none"> • Expand capability of TRUPACT to include shielding • Evaluation of applicability of the ChemNuclear Cask • Privatization
References	<ul style="list-style-type: none"> • Disposition Map Waste Stream: TRU 00294, 00430, 00431, 00566, 00567 • EMI Opportunity B-12 <i>Enhance Type B Packaging</i>
Waste/Material Type	RH TRU

14. There is a lack of rail access to the proposed Monitored Geologic Repository (MGR) at Yucca Mountain for SNF and HLW.	
Problem YELLOW	No rail access currently exists for SNF and HLW at the proposed Monitored Geologic Repository (MGR) at Yucca Mountain.
Impacts	<ul style="list-style-type: none"> • Increased cost and increased number of shipments. • Increased number of overweight truck shipments required. • New intermodal facility may be required.
Background	<p>Rail access is being considered in the Yucca MGR EIS.</p> <p>A Rail access to NTS would also benefit the LLW Program. LLW shipments are currently being made only by truck to the NTS for disposal. In addition, some affected states have strongly requested that the highway route across Hoover Dam not be used for DOE waste and material shipments.</p>
Status	RW focus in on site recommendation and licensing, currently no resources are allocated for transportation issues.
Suggested Solution	<ul style="list-style-type: none"> • Should be addressed upon completion of the Yucca Mountain EIS. • Link planning efforts with potential benefits to the LLW Disposal Program at NTS.
	<ul style="list-style-type: none"> • Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada • <i>Life-cycle Cost and Risk Analysis of Alternatives Configurations for Shipping Low-Level Radioactive Waste to the Nevada Test Site</i>, September 1999, Draft. • Final WM PEIS (DOE/EIS-0200-F) Appendix E Transportation, Part 1.
Waste/Material Type	HLW, SNF (LLW)

15. Packaging for unique waste and material types does not exist.	
Problem RED	Some waste and materials are too large or are of unusual shapes and will not fit into existing packaging. Also some material generates unusually high radiation fields requiring extraordinary shielding.
Impacts	<ul style="list-style-type: none"> • The lack of shipping containers for some unique waste and material types may delay closure of some sites • Additional radiation exposure to workers involved in waste processing • Delay of D&D at closure sites • Increased cost for design and construction of processing facilities to size wastes • Lack of packaging for oversized U233 waste at Fernald may delay closure
Background	<p>Fifty years of nuclear material research, development, and production has resulted in waste and material of unique form, size, shape, and radioactivity levels. The disposition of these items requires resizing, reshaping, and treatment, or some type of special packaging. In some cases, it is more appropriate to resize or dilute the item, while in other cases it is necessary to develop special packaging. Examples of these unique items are gloveboxes, piping, shielding, process equipment, and extremely high activity sources.</p> <p>No certified Type B packaging for some types of M/LLW (4,795 m³ of non-LSA Type B M/LLW).</p> <p>Unique wastes and materials must be evaluated on a case-by-case basis for resolution.</p>
Status	During the April 12-15 EM Integration Orphans Workshop in Albuquerque, NM, a Complex-wide team reviewed unique wastes and identified 115 specific wastes and materials that require special treatment or handling. Each of these 115 is assigned to a National Programs and Focus Areas for tracking and resolution.
Suggested Solutions	<ul style="list-style-type: none"> • NTP should assemble a packaging sub-team to investigate packaging needs. • NTP should assemble Integrated Product Teams to link process and packaging evaluations, and to assign wastes and materials for appropriate crosscutting evaluations.
References	<ul style="list-style-type: none"> • Disposition Map Waste Stream: ER 00021 • STCG Needs: RF-DD11, NV07-9902-05, DD02 • EMI Opportunity A-13 <i>Disposition of Material and Waste with no path to disposal.</i> • EMI Opportunity B-1 Orphan/Special Case Waste
Waste/Material Type	HLW, M/LLW, NM, SNF, TRU

ABBREVIATIONS

AC/PC	Accelerated Cleanup, Paths to Closure
AL	Albuquerque Operations Office
ANL-W	Argonne National Laboratory – West
ANSI	American National Standards Institute
ATMS	Automated Transportation Management System
ATMX	Atomic Monitors Explosives Transport
AVS	Analysis and Visualization System
BCL	Battelle Columbus Laboratory
CAO	Carlsbad Area Office
CH-TRU	Contact Handled Transuranic Waste
D&D	Deactivation and Decommission
DNSFB	Defense Nuclear Safety Facility Board
DOE	Department of Energy
DOT	Department of Transportation
DP	Defense Programs
EIS	Environmental Impact Statement
EM	Environmental Management
EMI	Environmental Management Integration
ER	Environmental Restoration
ETEC	Energy Technology Engineering Center
FCO	Facility Consent Order
GRD	Geologic Repository Disposal
HLW	High Level Waste
HQ	DOE Head Quarters
IAEA	International Atomic Energy Agency
ID	Idaho Operations Office
IEC	Integration Executive Committee
IP	Industrial Packaging
IPABS	Integrated Planning, Accountability, and Budgeting System
LLW	Low Level Waste
LSA	Low Specific Activity
MCOs	Multiple Canister Overpacks
MGR	Monitored Geologic Repository
MLLW	Mixed Low Level Waste
MOU	Memorandum of Understanding
MURR	Missouri University Research Reactor
MWFA	Mixed Waste Focus Area
NM	Nuclear Materials
NMPSO	Nuclear Material Project Support Office
NRC	Nuclear Regulatory Commission
NTP	National Transportation Program
NTPA	National Transportation Program (A – Albuquerque, I – Idaho, HQ – Headquarters)
OR	Oak Ridge
ORNL	Oak Ridge National Laboratory
PEIS	Programmatic Environmental Impact Statement
PMTS	Packaging Management Tracking System
QA/QC	Quality Assurance/Quality Control
R&D	Research and Development

ABBREVIATIONS

RAMPAC	Radioactive Materials Packaging Database
RCRA	Resource Conservation Recovery Act
RFP	Request for Proposal
RH	Remote Handled
S&T	Science and Technology
SAR	Safety Analysis Report
SARP	Safety Analysis Report for Packaging
SETF	Senior Executive Transportation Forum
SNF	Spent Nuclear Fuel
SNL	Sandia National Laboratory
SQS	Small Quantity Sites
STCG	Site Technology Coordinating Group
STG/WG	State and Tribal Governments Working Group
TEC/WG	Transportation External Coordination Working Group
TRU	Transuranic
TSD	Transportation Safety Division
TTP	Technical Task Plan
WIPP	Waste Isolation Pilot Plant
WM	Waste Management
WPD	Weapons Production Division (Albuquerque)
WVDP	West Valley Demonstration Project

Appendix A

Barriers by Waste Stream

Appendix A – Barriers by Waste Stream

Problem	WS Code	Map	Waste Type	From Site	To Site	Stream Name	Barrier	Barrier Issue	Barrier Comment	Score	Opportunity	Stream Narrative	DOT	NTP Comments
TRU														
2a 13	00294	TRU	TRU	ANLE	DOE	Remote Handled TRU Waste	Intersite Dependency	Intersite Transfer Issues		2	A-2 B-12 A-1 (add'l subs)	Waste will be returned to originating site.	Yes	A remote handled TRU waste cask is not available. Shipping systems, including packaging (containers, canisters, and casks) are not available to transport the waste/material to the next facility. The SARP for the 72-B packaging is still under review at NRC. WIPP will not build any of the packaging until the SARP is approved.
2a	00425	TRU	TRU	ORTN	WIPP	Treated CH-TRU Solid Debris	Work Scope Definition	Other Work Scope Definition Issues	TRUPACT II's are not available to transport the waste/material to WIPP.	3	B-15	Requires TRUPACT-II cask for shipment	Yes	
2a 13	00430	TRU	TRU	ORTN	WIPP	REDC Pretreatment RH Waste - Curium Targets	Technology	Inadequate Packaging Capabilities (Including Containers)	Containers for the waste have not been designed.	5	A-2 B-12	Waste to be processed to final form by generator. Waste will be overpacked in a	Yes	

Problem	WS Code	Map	Waste Type	From Site	To Site	Stream Name	Barrier	Barrier Issue	Barrier Comment	Score	Opportunity	Stream Narrative	DOT	NTP Comments
												Ten Drum OverPack (TDOP) and shipped in TRUPACT.		
2a 13	00431	TRU	TRU	ORTN	WIPP	REDC Pretreatment RH Waste - MK 42 Targets	Technology	Inadequate Packaging Capabilities (Including Containers)	Inner containers for the waste have not been designed. The overall technological approach for analyzing and packaging the waste has not been identified.	5	A-2 B-12	Requires 72-B Casks	Yes	Shipping systems, including packaging (containers, canisters, and casks) are not available to transport the waste/material to the next facility. The SARP for the 72-B packaging is still under review at NRC. WIPP will not build any of the packaging until the SARP is approved.
2a	00432	TRU	TRU	ORTN	WIPP	Certified CH-TRU Debris > FY2005	Work Scope Definition	Other Work Scope Definition Issues	TRUPACT II's are not available to transport the waste/material to WIPP.	3	B-12	Requires TRUPACT II	Yes	Additional packaging needed
2a 13	00566	TRU	TRU	SARS	SARS	High Activity TRU Drums Requiring Processing	Technology	Inadequate Packaging Capabilities (Including Containers)	Waste stream may not be successfully blended to meet TRUPACT II limits. Increased transportation limit may reduce the amount of processing required	3	B-15		No	
							Technology	Inadequate Shipping Systems						
2a 13	00567	TRU	TRU	SARS	SARS	High Activity Drums	Technology	Inadequate Shipping	The new TYPE B shipping container is not currently in	4	B-12		No	

Problem	WS Code	Map	Waste Type	From Site	To Site	Stream Name	Barrier	Barrier Issue	Barrier Comment	Score	Opportunity	Stream Narrative	DOT	NTP Comments
						Requiring Treatment		Systems	development					
2a	00571	TRU	TRU	SARS	SARS	Carbon Steel Containers and Casks Requiring Treatment	Technology	Inadequate Shipping Systems	The new TYPE B shipping container is not being developed	4	C-11 B-12		No	
10	01568	TRU	SNF	HASI	HASI	Ret TRU to SNF Program	Technology	Inadequate Packaging Capabilities (Including Containers)		3	B-12 B-15	0.1m3 transfer to SNF Program (0.02 MTHM).	No	Insufficient detail
2a	01769	TRU	TRU	LABL	TBDO	CH TRU Aqueous Liquids (Non-Defense)	Work Scope Definition	Unformed Policy	It is unknown whether there are any problems with receiving capabilities (example, container handling). It is unknown whether characterization is sufficient to support designation under Department of Transportation (DOT) or onsite transportation requirements. Shipping systems, including packaging (containers, canisters, TRUPACTs and casks as required) are not available to transport the waste/material to the next facility. Do not know where it can go for disposal or what it will require for shipment.	5	B-12 B-15	Because LBNL's "CB" waste stream is non-defense, congressional legislation will be required to allow the waste to be disposed of at WIPP.	No	There is no policy to transport liquid TRU waste.

Problem	WS Code	Map	Waste Type	From Site	To Site	Stream Name	Barrier	Barrier Issue	Barrier Comment	Score	Opportunity	Stream Narrative	DOT	NTP Comments
2a 7	03039	TRU	LLW	ORTN	DOE	TWTP Sludge/Supernate TRT Secondary Waste	Intersite Dependency	Intersite Transfer Issues	No approved program/access to offsite DOE facility.	2	B-3	Industrial packaging (per 49 CFR 173.411) rather than Strong Tight Container required LSA > A2	Yes	
2a 7	03043	TRU	LLW	ORTN	DOE	LLW (from TWRF D&D)	Intersite Dependency	Intersite Transfer Issues	No approved program/access to offsite DOE facility.	2	B-3 C-14	Industrial Packagings (per 49 CFR 173.411) rather than Strong Tight Containers required for LSA > A2	Yes	
2a 8	03223	TRU	TRU	SARS	WIPP	TRU Waste Ready for Ship to WIPP	Technology Intersite Dependency	Inadequate Shipping Systems Intersite Transfer Issues	TRUPACT II shipping container requires modification to accept increase load limits for heat load and gas generation. Southern corridor funding uncertain.	4	B-12 B-15	Facilities not available to meet the out-year shipment schedule. The modified TRUPACT II limit may not be adequate to ship all waste.	Yes	Waste contains some non-compliant RCRA constituents (P and U listed) not in the WIPP permit. Modification to TRUPACT II requires modification for shipping waste.
SNF														
None	00724	SNF	SNF	INEL	INEL	Dry Graphite, Stainless, Zirc, & Misc	Intersite Dependency	Intersite Transfer Issues	Not all issues associated with receipt of fuel from SNL, SRS, and ORNL and other	3	None	Spent Nuclear Fuel information used in this	No	Insufficient detail to assign opportunity

Problem	WS Code	Map	Waste Type	From Site	To Site	Stream Name	Barrier	Barrier Issue	Barrier Comment	Score	Opportunity	Stream Narrative	DOT	NTP Comments
						SNF			offsite locations have been identified. Logistics of cask availability have not been completely verified.			stream was taken from the National Spent Nuclear Database.		
10	00728	SNF	SNF	INEL	GRD	NRC Licensed Storage	Technology	Inadequate Packaging Capabilities (Including Containers)	Final repository package has not been completed and certified. Logistics and availability of a cask capable of moving this material have not been identified.	4	B-13.2		Yes	
							Technology	Inadequate Shipping Systems						
10	00730	SNF	SNF	INEL	INEL	Dry Commercial SNF	Technology	Inadequate Packaging Capabilities (Including Containers)	It is likely that the fuels stored dry on the TAN pad would be repackaged prior to shipment, since not all of the casks used for storage are certified for transport. This repackaging would be expected to be done in the TAN Hot Shop that may not be available. The required transfer/transport systems are not available to move the material from the current facility to the next activity location. Road from TAN to highway 20 may require upgrades to support weight of casks. Will require heavy haul tractor/trailer to	4	B-13.2	Spent Nuclear Fuel information used in this stream was taken from the National Spent Nuclear Database.	No	Shipment under current consolidation plan may result in some transportation schedule conflicts due to limited cask availability.
							Technology	Inadequate Shipping Systems						

Problem	WS Code	Map	Waste Type	From Site	To Site	Stream Name	Barrier	Barrier Issue	Barrier Comment	Score	Opportunity	Stream Narrative	DOT	NTP Comments
									transport casks.					
10	00732	SNF	SNF	INEL	INEL	Colorado FSV SNF	Technology	Inadequate Packaging Capabilities (Including Containers)	Final package design for disposition is not available. Facility for performing that packaging capability is not designated or does not exist.	3	B-12	Spent Nuclear Fuel information used in this stream was taken from the National Spent Nuclear Database.	No	Logistics for transportation and repackaging need to be resolved.
10	00738	SNF	SNF	INEL	SARS	Dry Aluminum Based SNF	Technology	Inadequate Packaging Capabilities (Including Containers)	Determination of whether the fuels can be shipped in their current configuration is required. Need for inclusion of neutron poison to prevent criticality must be determined. There are not sufficient numbers of licensed casks to move this fuel. Not all transportation logistics have been resolved.	4	B-12	Spent Nuclear Fuel information used in this stream was taken from the National Spent Nuclear Database.	Yes	
							Technology	Inadequate Shipping Systems						
10	00740	SNF	SNF	INEL	INEL	INTEC 603 Metallic Sodium Bonded	Technology	Inadequate Shipping Systems	Cask systems are not sufficient to move the material to the next activity/location. The transportation cask to send the sodium bonded SNF to ANL-W needs to be designed, procured, and licensed. There is not a cask available now for those transfers.	4	B-12	Spent Nuclear Fuel information used in this stream was taken from the National Spent Nuclear Database.	No	Intra or intersite transport casks must be available to ship this fuel from INTEC to the treatment or disposition facility.
10	00742	SNF	SNF	INEL	INEL	Packaged/Dried Metallic Na Bonded	Technology	Inadequate Shipping Systems	Casks are not available that can be licensed to move fuel over the road, even from INTEC to ANL-W.	4	B-12		No	
10	00744	SNF	SNF	INEL	INEL	ANL-W	Intersite	Intersite	Transportation casks must	1	B-12	In FY-98 and in	No	

Problem	WS Code	Map	Waste Type	From Site	To Site	Stream Name	Barrier	Barrier Issue	Barrier Comment	Score	Opportunity	Stream Narrative	DOT	NTP Comments
						Metallic Sodium Bonded	Dependency Technology	Transfer Issues Inadequate Shipping Systems	be available to move fuel from INTEC to the treatment facility/site. Casks are not available that can be licensed to move fuel over the road, even from INTEC to ANL-W. Top and bottom loading casks will be required to move Fermi Blanket fuel from CPP 749 to HFEF or the ultimate processing facility.			FY-99 actual quantities of Sodium Bonded SNF was dispositioned in proof of process testing of the electro-metallurgical treatment (EMT) at ANL-W.		
None	02303	SNF	SNF	INEL	INEL	WVDP SNF	Technology	Inadequate Shipping Systems	The West Valley fuel shipments are two acceptable casks, rental of which is dependent on availability. The category of risk is Inadequate Shipping Capabilities. INEEL will not develop new technology to add casks for shipment. INEEL just need more casks. As such no STCG need is warranted. Technology risk is the only place Shipping Issues appear.	3	None		Yes	
10	02688	SNF	SNF	INEL	INEL	Repackaged Dry Graphite	Technology	Inadequate Packaging Capabilities (Including Containers)	Design of final disposal package is not complete and certified. Facility for repackaging does not currently exist.	4	B-12		No	

Problem	WS Code	Map	Waste Type	From Site	To Site	Stream Name	Barrier	Barrier Issue	Barrier Comment	Score	Opportunity	Stream Narrative	DOT	NTP Comments
HLW														
11	00634	HLW	HLW	WVDP	GRD	Disposal of Vitrified HLW	Technology	Inadequate Shipping Systems	No licensed transfer/transport systems exist to move the HLW canisters from their storage location to the next facility. A transportation study report has been published evaluating costs and schedules for multiple HLW canister transportation destinations.	3	B-12	.	Yes	Interim Storage Facility has not been determined and as a result required transportation has not been determined. Transport containers for off-site shipment are in evaluation
MLLW														
None	02391	MLLW	MLLW	LANL	COMM	Gas Cylinders Legacy	Technology	Inadequate Packaging Capabilities (Including Containers)	Shipping systems, including packaging (containers, canisters, TRUPACTs and casks as required) are not available to transport the waste/material to the next facility. Shipping and packaging capabilities are generally sufficient. However, problems exist with poison inhalation hazard (PIH) limits for shipping. This is a site-specific problem that is expected to be resolved. Additionally, some of the cylinders do not meet DOT requirements and cannot be shipped to a treatment facility without being repackaged or over packed. LANL does not	4	None	This waste group is legacy MLLW, not including that generated in FY95, FY96, FY97, and FY98, destined for off-site commercial treatment and is part of the STP. It consists of treatability groups LA-W917-18, 26.	Yes	Transportation details to be determined.

Problem	WS Code	Map	Waste Type	From Site	To Site	Stream Name	Barrier	Barrier Issue	Barrier Comment	Score	Opportunity	Stream Narrative	DOT	NTP Comments
									currently have this capability.					
ER														
2b	00015	ER	TRU	CEMP	CEMP	TRU Contaminated Rubble/Debris	Intersite Dependency	Intersite Transfer Issues	Shipping systems, including interim containers or packaging, are not available to transport the waste/material to treatment or the next facility. There are technology gaps associated with this waste/material stream. Shipping containers. It is unknown whether a packaging and/or shipping facility is currently operational. No capabilities exist to complete the characterization of the waste required for shipping by the WAC of the receiving facility (physical sampling capability, onsite analytical capability, offsite contracts, etc.).	2	B-12 B-15	ALL OH-CL-02-D West Jefferson Related Waste 31.20 cu. meters	Yes	Transportation data unavailable at this time.
15	00021	ER	LLW	BRNL	COMM	Boneyard Sources	Technology	Inadequate Shipping Systems		3	B-1	Legacy waste stored in OUI. Includes 50 Ci AmBe Source, 1,000 Ci 60 Co Source, 5,600 Ci 60 Co Source, and 5,700 Ci 137 Cs Source. Act ID: BW0900	Yes	Insufficient detail to assign opportunity
2b	01726	ER	TRU	GENC	TBDO	TRU-Contaminated	Intersite Dependency	Intersite Transfer	Completion dependent upon ability to ship to WIPP; or, to	3	B-12 B-15		Yes	Insufficient detail to assign opportunity

Problem	WS Code	Map	Waste Type	From Site	To Site	Stream Name	Barrier	Barrier Issue	Barrier Comment	Score	Opportunity	Stream Narrative	DOT	NTP Comments
						Rubble/ Debris (packaged)		Issues	an interim site. There are problems with receiving capabilities (example, container handling					Transportation related
2b	01866	ER	TRU	SPRU	SPRU	TRU-Pipes, Tanks & Equipment (not rinsed)	Intersite Dependency	Intersite Transfer Issues	A contract for Phase 2 of the SPRU Clean-up Project will not be awarded until FY2006. Once awarded, contractor will work with WIPP on waste acceptance. It is not known if shipping systems, including interim containers or packaging, are available to transport the waste/material to treatment. Shipping systems have not been identified for shipping TRU type waste.	2	B-12 B-15	Waste stream will be generated during Phase 2 of the SPRU Clean-up Project, FY2009. A contract for Phase 2 activities will not be awarded until FY2006. Once awarded, Contractor will manage the waste to meet WIPP's waste acceptance criteria.	No	Insufficient detail to assign opportunity. Transportation related.

Appendix B

Disposition Map Barrier Column Heading Definitions

Appendix B

Disposition Map Barrier Column Heading Definitions

These tables show the waste streams from the EM disposition maps. Column heading descriptions are:

WS Code

This is a unique identifier for each waste stream, and is used by the computer.

Map

This designates which disposition map the waste stream is located. Previously, responsibility was assigned to Program Area Integration Teams (PAITs).

Waste Type

This denotes the specific category of waste that makes up this waste stream.

From Site

Denotes the site the waste will be shipped from, or origin site. Acronyms are explained on the following page.

To Site

Denotes the receiving site, or destination site.

Stream Name

This is a site-designated description of the specific waste form. These are the same descriptions shown on the disposition maps.

Barrier

These are one of the four barriers as described in Section 2.2.

Barrier Issue

These are one of the seven transportation-related barrier issues.

Barrier Comment

These comments are provided by the sites and programs as needed.

Score

These numbers equate to red (5 & 4), yellow (3 & 2), and green lights (1). A score of five (red) denotes that a very serious barrier exists. The numbers graduate to a score of one (green) denoting that no barrier is known.

Opportunity

This column shows the EM Opportunity that is intended to resolve the barrier.

Stream Narrative

These comments were provided by sites and programs for clarification.

DOT Regulated?

This is marked yes if the shipment must follow DOT Regulations

NTP Comments

These comments were added by NTP for this report and are not a part of the Paths to Closure database

Appendix C

Site Code References

WS Code

Appendix C Site Code References

Geo Site Code	Site Code	Geo Site Name	Geo Site Short Name	State Code	State Name
ANLE	ANLE	Argonne National Laboratory – East	Argonne East	IL	Illinois
BRNL	BNL	Brookhaven National Laboratory	Brookhaven	NY	New York
CEMP	BCLJ	Columbus Env. Management Project – West Jefferson	Battelle WJ	OH	Ohio
COMM	COMM	Commercial Site – TBD	Commercial - TBD	NA	Not Applicable
DOE	DOE	DOE Site – TBD	DOE - TBD		Not Applicable
GENC	GE	General Electric Vallecitos Nuclear Center	GE Vallecitos	CA	California
GRD	GRD	Geologic Repository Disposal	HLW Repository	NV	Nevada
HASI	HANF	Hanford Site	Hanford	WA	Washington
INEL	INEL	Idaho National Engineering and Environmental Lab.	Idaho	ID	Idaho
LABL	LBNL	Lawrence Berkeley National Laboratory	Lawrence Berkeley	CA	California
LANL	LANL	Los Alamos National Laboratory	Los Alamos	NM	New Mexico
ORTN	ORR	Oak Ridge Reservation	Oak Ridge	TN	Tennessee
SARS	SRS	Savannah River Site	Savannah	SC	South Carolina
SPRU	SPRU	Separations Process Research Unit	SPRU	NY	New York
TBD	TBD	To Be Determined	TBD		Not Applicable
TBDO	TBDO	To Be Determined/Off-Site	TBD/Off-Site		Not Applicable
WIPP	WIPP	Waste Isolation Pilot Plant	WIPP	NM	New Mexico
WVDP	WVDP	West Valley Demonstration Project	West Valley	NY	New York

Codes that are different are shown in red



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